PATENT SPECIFICATION

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Complete Accepted: Nov. 6, 1924.

COMPLETE SPECIFICATION.

Improved Method and Means for Cooling Sweetmeats.

I, HARRY BERTZ, of 90, West Street, New York, State of New York, United States of America, a citizen of the United States of America, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to a method and means for cooling sweetmeats, and particularly to apparatus for cooling sweetmeats coming from a coating machine in which they have received an application or coating of a heated substance which congeals or hardens at a lower temperature. The coated sweetmeats from the coating machine are commonly stored in racks in chilled rooms until the chocolate or coating has set or hardened. This entails considerable handling, necessitates the employment of a large amount of storage space, and delays the final packing. Attempts have been made to simplify this process by conducting the coated sweetmeats upon a conveyor through a chilled chamber, but the results have been unsatisfactory for various reasons, such as poor control of the temperature which results in greying the chocolate if chilled too suddenly, and incomplete hardening of the coating upon the surfaces of the sweetmeats in contact with the conveyor.

An object of this invention is to provide an improved method and apparatus for subjecting sweetmeats to temperature conditions varying progressively in kind from a given starting temperature, in an efficient, convenient and expeditious manner. A further object is to provide an improved method and apparatus for cooling coated sweetmeats to cause the coating to set, with which the sweetmeats may be progressively chilled on all sides concomitantly and in an efficient, effective and expeditious manner; which chilling can be effected within a minimum of floor space and with a minimum of handling of the sweetmeats; with which the temperatures to which the sweetmeats are subjected can be accurately regulated; and the apparatus of which is simple, durable, compact, convenient and inexpensive. A further object is to provide an improved apparatus for attachment to and forming a part of a coating machine for continuously receiving directly therefrom the coated sweetmeats and chilling them in a desired manner without manual handling, and for delivering the same in a condition for direct packing. Other objects and advantages will be apparent from the following description of an embodiment of the invention and the novel features will be particularly pointed out in claims.

According to the invention, sweetmeats which require cooling are conducted from one point to another upon a conveyor and while so conducted are subjected to progressively lowering temperatures, whereby they will be progressively chilled; also according to the invention apparatus is provided whereby the sweetmeats are chilled by being conducted through a progressively decreasing temperature.

In the accompanying drawings:

Fig. 1 is an elevation of one form of apparatus according to the invention used in connection with a coating machine;

Fig. 2 is a sectional elevation of a portion of the same;

Fig. 3 is a plan of the portion of the device shown in Fig. 2;

Fig. 4 is an elevation of the discharge end of the cooling device;

Fig. 5 is a sectional elevation of the cylinder and mounting means; and

Fig. 6 is a section of the same taken substantially along the line *b*—*b* of Fig. 2.

Referring to the drawings a suitable coating machine 1 is disposed in a room at one side of a partition 2 and the cooling device is disposed in a room upon the opposite side of the partition 2. An elongated enclosure 3, rectangular in cross section is supported upon suitable frames 4 so as to extend away from the partition 2 adjacent the coating machine. The enclosure is composed of a number of sections connected end for end so as to form with their connected interiors a continuous tunnel or conduit 5. The floors 6 of the enclosure sections are made hollow, as at 7, to form a conduit extending lengthwise of each section, and the ends of the conduit 7 of each section are closed. The conduits of the floor sections are, however, connected at their abutting ends by pipes 8 which permit of a circulation of a liquid through the hollow floor from end to end of the united sections. An extra section 9 of the hollow floor is provided beyond the end of the tunnel so as to form a delivery surface or platform.

At the end of the end section 9 of the floor, a standard 10 is disposed and provided with suitable guide bars 11 arranged in pairs in parallel horizontal relation at each side of the standard 10. A shaft 12 extends crosswise of the standard 10 and at each side projects through the opening 13, between the pair of parallel guide bars 11. The ends of the shaft 12 which project through the openings 13 pass through bearing blocks 14 and 15 which are mounted between the guide bars 11, one at each side, so as to permit the shaft to be shifted bodily toward and from the end section 9 forming the delivery platform.

The bearing block 15 is provided with an arm 16 depending along the exterior faces of the adjacent guide bars 11 and this arm is forked at its lower end so as to provide a pair of spaced and aligned bearings 17. A driving shaft 18 extends lengthwise of the enclosure, at one side thereof, and passes through and has bearing in the two bearings 17 of the depending arm 16. Between the bearings 17, the shaft 18 carries a worm 19 which is keyed thereto so as to be slidable along the shaft 18 when the bearings 17 and the bearing block 15 are shifted along the guide bars 11. The end of the shaft 12 which projects through the bearing block 15 is provided with a worm wheel 20 which meshes with the worm 19.

A screw rod 21 is rotatably confined, as by cotter pins 22, in slotted bosses 23 at the ends of the bearing bars 11 upon the side of the standard 10 carrying the worm wheel 20. The screw rod is provided with collars 24 and 25 which engage with the ends of the slotted bearing bosses and limit lengthwise movement of the screw 21 while permitting rotary movement. One end of the screw rod 21 is provided with a wing button 26 by means of which the screw rod may be rotated. The screw rod 21 passes through and has threaded engagement with the arm 16, depending from the bearing block 15, so that whenever the screw rod is rotated the bearing block 15 will act as a nut thereon and be shifted along the same and thus carry the shaft 12 in a direction lengthwise of the screw rod 21.

A screw rod 27 is confined by cotter pins 27^a in slotted bosses 28 upon the bars 11 at the opposite side of the standard 10, and has threaded engagement with an arm 14^a depending from the bearing 14, so that when the screw rod 27 is rotated by its wing button 26^a the bearing 14 will be shifted along the opening 13 formed between the guide bars 11 at that side of the standard 10. By turning the screw rods 21 and 27 the shaft 12 can be shifted bodily toward and from the end of the delivery platform 9. The shaft 12, between the bearing bars 11 at each side, is provided with a cylinder 29 carrying a corrugated rubber sheet or layer 30 upon its periphery.

An endless belt or conveyor 31 passes over and around the guide bar 32 of the coating machine and also passes through an aperture 33 in the partition 2 which separates the coating machine from the cooling device. The upper stretch of the endless belt passes lengthwise through the tunnel 5 of the combined sections of the enclosure, in close proximity to or resting upon the hollow floor 6, and emerges over and upon the delivery platform 9. The upper stretch of the belt or conveyor passes over and around the cylinder 29 and then returns beneath the tunnel to the coating machine, being guided during its travel beneath the tunnel or enclosure by suitable idlers 34 arranged at intervals in the supporting frames 4. The lower stretch passes beneath an idler 35 before passing upwardly through the aperture 33 to the guide bar 32 of the coating machine. By rotating the screw rods 21 and 27 the cylinder 29 may be shifted toward or from the end of the delivery platform 9 so as to tighten or loosen the endless belt or conveyor.

The shaft 18 which drives the cylinder 29 extends along the side of the enclosure

of the cooling device and is supported at intervals therealong by means of bearing brackets 36 projecting from the supporting frames 4. The shaft 18 extends through the partition 2 and has a driving relation (not specifically shown) with the coating machine so as to be operated concomitantly therewith. Therefore, when the coating machine is in operation the endless belt or conveyor 31 will be driven continuously and will carry the coated sweetmeats, deposited by the coating machine, upon the upper stretch thereof through the partition 2, the tunnel 5 from end to end, and out upon the delivery platform 9 at which point the sweetmeats are removed by attendants and packed directly into suitable containers. The shaft 18 is preferably formed in sections which are connected one to another by suitable universal couplings 37.

At the delivery end of the tunnel the enclosure 3 is provided with an inlet conduit 38 through which a current of air, that has been previously chilled to a desired temperature, is delivered into the interior of the tunnel. A deflecting wall 39 is provided in the tunnel below and to the rear of the inlet conduit 38 and is curved toward the inlet end of the tunnel so as to deflect the incoming current of air toward the opposite end of the tunnel and counter to the direction of travel of the upper stretch of the conveyor. At the inlet end of the tunnel and adjacent the partition 2, the enclosure 3 is provided with an outlet conduit 40 which connects with the interior of the tunnel 5, and also preferably with a suitable exhaust fan, so as to remove the air from the tunnel 5. A suitable deflecting plate 41 is provided in the tunnel 5, slightly spaced, above the conveyor, curved toward the opposite end of the tunnel, and arranged nearer the inlet end of the tunnel than the opening of the conduit 40, so as to deflect upwardly into the conduit 40 the current of chilled air passing through the tunnel from the inlet conduit 38.

An inlet pipe 42 is connected to the extreme outer end of the channel or conduit 7 in the hollow floor of the section 9, and an outlet pipe 43 is connected to the channel or conduit 7 of the hollow floor 6 in the section nearest to the coating machine and at the end thereof nearest to the coating machine, so that a liquid entering the channel or conduit of the platform 9 will progress from section to section towards the coating machine and leave the floor through the outlet pipe 43 at the point where the conveyor first enters the tunnel. The liquid is previously chilled to a suitable temperature, which temperature may be varied, so that the floor over which the upper stretch of the conveyor moves will be given any desired temperature and the floor becomes progressively warmer toward the entrance end of the tunnel due to an interchange of heat with the articles upon the conveyor. The inlet end of each pipe 8, which will be at the discharge end of each floor section, extends into close proximity to the upper wall of the channel of that floor section. In this manner the air enclosed in each channel of the floor section will be carried out when the channels are filled initially with the liquid, or when air enters during the operation of the device. The outlet pipe 43 extends into close proximity to the upper wall of the conduit of the floor section to which it is connected, so that the air which is carried along from section to section will be eventually and entirely removed from the floor channels.

The sections of the tunnel 5 are provided at intervals with suitable windows 44 which are slidably mounted in guides 45 upon the upper face of the enclosure, so as to permit of observation of the movement of the articles through the tunnel without opening the enclosure. The window may, however, be operated so as to permit access to be had to the interior of the enclosure for removing samples at various stages in the chilling, and for the purpose of making repairs. A tray 46 may be disposed upon the standard 10 beneath the cylinder 29 so as to receive and hold any articles falling from the conveyor as it passes around the cylinder 29.

In the operation of the machine the sweetmeats which are coated in the coating machine are deposited upon the upper stretch of the conveyor 31. During the operation of the coating machine the shaft 18 will be driven therefrom, and the shaft in turn operates through the worm 19, worm wheel 20 and cylinder 29 to drive the endless conveyor and carry the upper stretch from the coating machine through the tunnel. The sweetmeats deposited upon the conveyor will therefore be carried through the aperture 33 in the partition 2, then lengthwise through the tunnel 5 in the enclosure, and when emerging from the tunnel will be carried over the delivery platform 9.

At the same time, a current of chilled air will be forced by a pump or fan (not shown) through the conduit 38 into the interior of the tunnel near the outlet thereof. The deflector plate 39 is disposed so as to clear the sweetmeats mov-

ing with the conveyor and is curved to deflect this incoming current of air lengthwise of the tunnel toward the end where the conveyor enters the tunnel. The air passing through the tunnel will pass around the sweetmeats carried by the conveyor and will chill the same to the desired temperature and upon reaching the end of the tunnel where the sweetmeats enter, the air will be deflected by the curved plate 41 into the outlet conduit 40. The outlet 40 is also preferably connected with an exhaust fan or pump so as to facilitate the movement of air along the tunnel counter to the direction of movement of the conveyor.

At the same time, water is forced under pressure through the inlet pipe 42 into the channel or conduit 7 of the platform floor section 9 and thence from section to section of the hollow floor until it reaches the end adjacent the coating machine where it is conducted away through the outlet pipe 43. The water passing through the hollow floors is previously chilled to the desired temperature and will accordingly chill the upper surface of the floor. The upper stretch of the conveyor moves in close proximity to the floor, and preferably rests upon same, during its travel through the tunnel. An exchange of heat will consequently occur through the conveyor between the coated sweetmeats and the cool liquid in the hollow floor, so that the sweetmeats will be chilled upon the surface upon which they rest concomitantly with their chilling by the current of air passing through the tunnel.

By varying the rate of travel of the air and water through the tunnel and floor respectively, and by varying the initial temperatures, the rate of chilling of the sweetmeats can be accurately controlled, so as to prevent too rapid chilling with consequent greying of the chocolate when the device is used for chocolate coated sweetmeats. When the sweetmeats emerge from the tunnel, the coating or covering has been chilled and set on all of its surfaces so that as they move over the platform 9 attendants can remove and pack the same directly in cartons.

Broken particles will fall from the conveyor as it passes around the cylinder 29 and be received in the receptacle 46. If any of the sweetmeats unavoidably pass by the attendants they will fall into the receptacle 46 and can then be subsequently removed. The corrugated peripheral surface of the rubber coating 30 of the cylinder 29 insures a firm and positive drive for the conveyor, and by turning the screws 21 and 27 the cylinder may be adjusted to tighten the belt equally or unequally at opposite sides so as to compensate for slackness or unequalities in the conveyor. The conveyor after passing around the cylinder 29 is guided upon the idlers 34 and 35 beneath the enclosure back to the coating machine, where it receives a new deposit of coated sweetmeats. The universal coupling 37 in the shaft 18 serve to prevent binding of the shaft in the bearings which might be due to non-alignment of the bearings, and to permit of the extension of the shaft when other tunnel sections are added to the chilling device. The conveyor is preferably formed of fabric, and is provided upon its outer face with a layer of wax paper, or is otherwise glazed so as to prevent sticking of the sweetmeats deposited thereon.

We have found that very satisfactory results are obtained when the air is admitted to the tunnel at a temperature of 40° F., and when the water is admitted at a temperature ranging from 36° to 40° F., but obviously other temperatures will be utilized when changes in the rate of chilling of the sweetmeats is desired. The coating machine is usually operated in a room having a temperature considerably above that desired for the room in which the sweetmeats are packed, and the partition 2 serves to separate these rooms and permit of a maintenance of different temperatures therein, the aperture 33 in the partition serving to permit of the passage of the conveyor from one room to the other.

I am aware that in apparatus for cooling ice or frozen material to a point below freezing point it has been proposed to push or rake the material along the floor of a chamber and discharge it into a hopper at the end, by means of stirrers or rakes carried by an endless chain, while a cooling fluid is passed in a direction opposite to the direction of the travel of the material, the chamber having a hollow bottom or a jacket through which a cooling fluid is passed in the same direction as the cooling fluid in the chamber, and to such cooling apparatus and to heat exchange apparatus working on the counter-current principle, no claim *per se* is here made.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. A method and means of cooling sweetmeats in which the sweetmeats are initially conducted from one point to another upon a conveyor and while so conducted are subjected to progressively

lowering temperatures whereby the sweetmeats will be progressively chilled.

2. A method and means of cooling sweetmeats in which the sweetmeats are conducted on an endless conveyor through a suitable gas whose temperature varies progressively substantially throughout the travel of the conveyor, the temperature of the gas where the sweetmeats first encounter it being nearer the temperature of the sweetmeats to be treated at that time than where they are removed from the gas.

3. The method and means of cooling sweetmeats according to Claim 2 wherein the underside of the endless conveyor is further and independently subjected to a change of temperature corresponding substantially to the temperature changes in the gas to which the sweetmeats are exposed.

4. Apparatus for cooling sweetmeats according to Claim 2 comprising a tunnel, a conveyor for the sweetmeats having a progressive movement through the tunnel, and means for passing a cooling medium or media through the tunnel, which movement of the medium or media will be in a direction opposite to the travel of the conveyor.

5. Apparatus for cooling sweetmeats according to Claim 4, wherein the tunnel has a hollow floor along which the conveyor travels, means being provided for passing a cooling medium or cooling media through the hollow floor in the opposite direction to the movement of the conveyor over the hollow floor.

6. In apparatus for cooling sweetmeats, according to Claim 1, a conveyor upon which the sweetmeats are initially conducted through a tunnel from one point to another over and in proximity to a hollow floor, the tunnel being filled with a chilling fluid and the floor being completely closed and cut off from the atmosphere, and through which a cooling fluid is circulated.

7. In apparatus for cooling sweetmeats according to Claim 4, a hollow floor to the tunnel, completely closed and cut off from the atmosphere and having means for circulating a cooling fluid therethrough.

8. Apparatus according to any of Claims 5, 6 or 7 wherein the tunnel and hollow floor are built up from a number of sections joined end to end, the exit of each section of the hollow floor being at a point near the top to ensure the expulsion of air or other contents and the efficient contact of the cooling medium with the under side of the floor, the extreme end sections of the tunnel and the hollow floor having respectively inlets and outlets for the cooling medium or cooling media and being connected to circulation apparatus.

9. Apparatus for cooling sweetmeats according to any of the preceding claims, in combination with a coating machine having an endless conveyor which conducts the coated article to the support on which the body or bodies are conducted through the treating medium.

10. Apparatus for cooling sweetmeats constructed and adapted to operate substantially as set forth and as illustrated in the accompanying drawings.

Dated this 13th day of August, 1923.

HEYS, SON, DAVIES & PATTISON,
Agents for the Applicant.

Redhill: Printed for His Majesty's Stationery Office, by Love & Malcomson, Ltd.—1924.

Fig. 1.

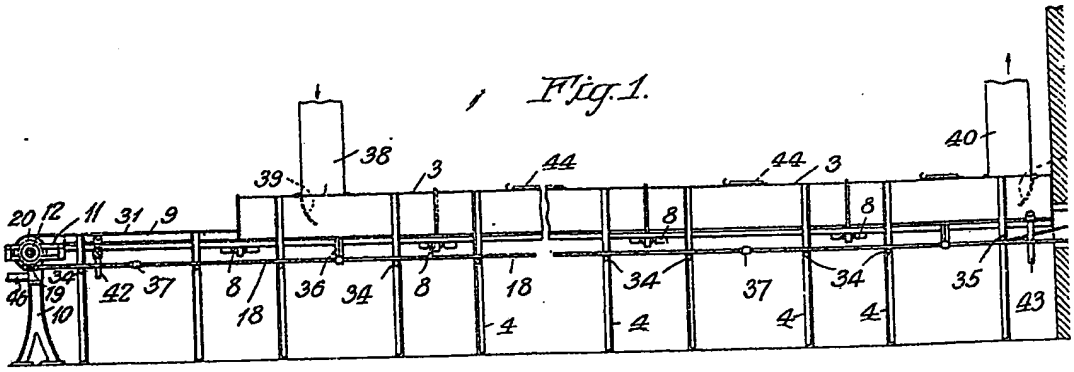


Fig. 2.

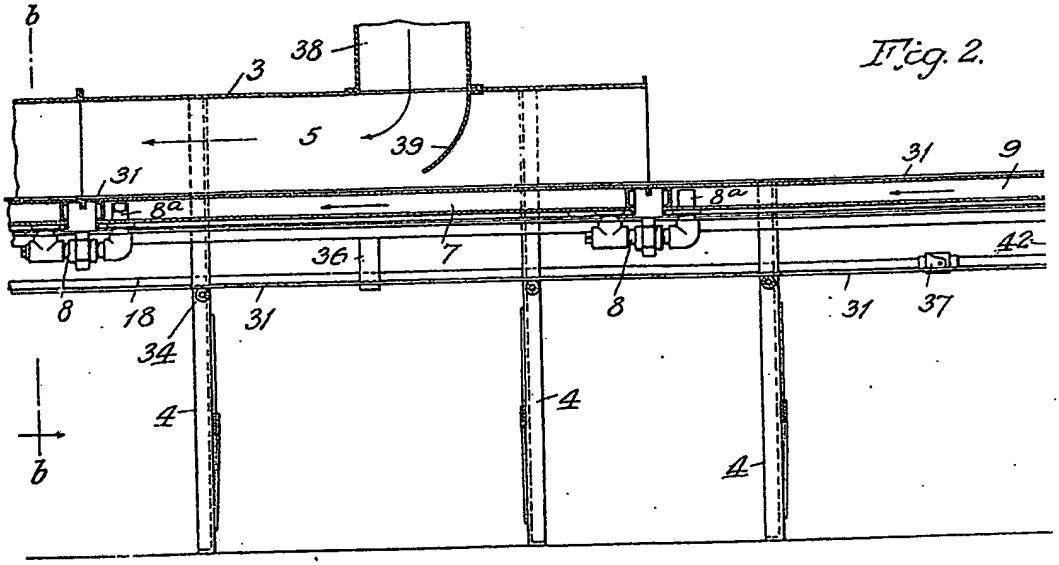
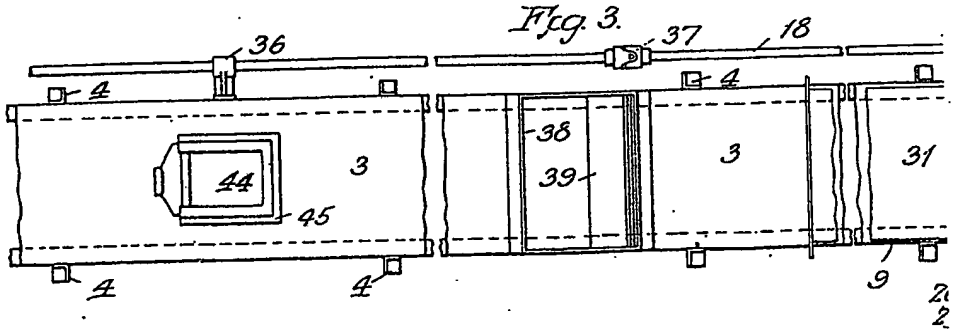


Fig. 3.



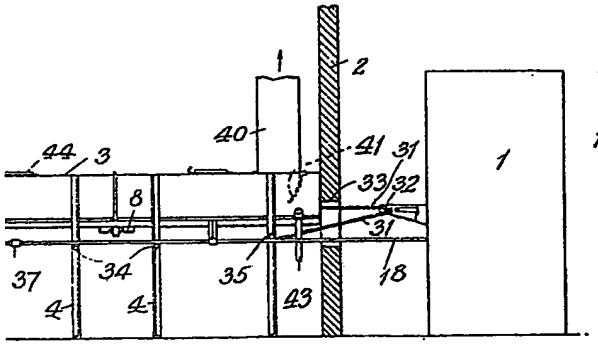


Fig. 4.

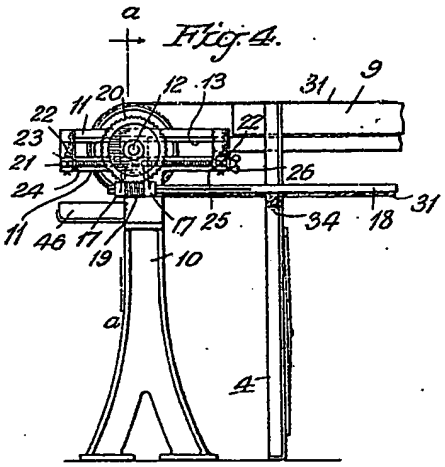


Fig. 5.

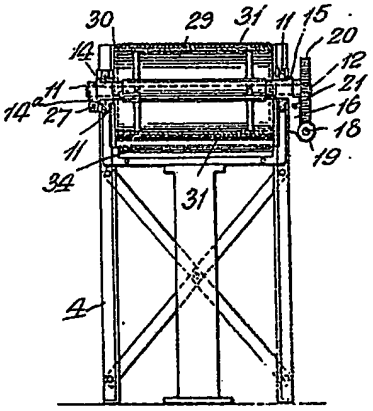
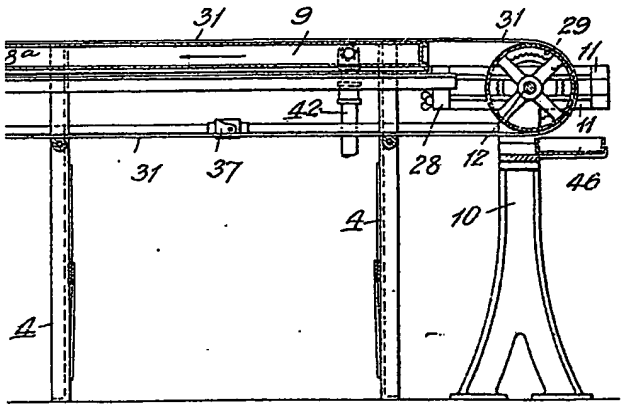


Fig. 2.



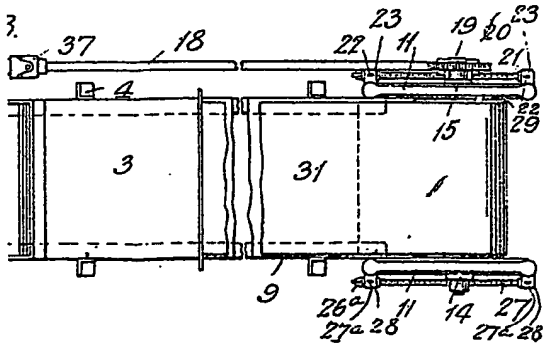
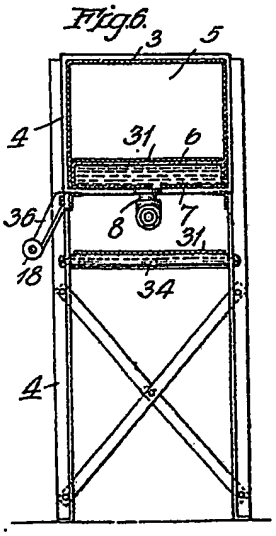


Fig. 6.



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202,684 COMPLETE SPECIFICATION

1 SHEET

[This Drawing is a reproduction of the Original on a reduced scale]

Fig. 1.

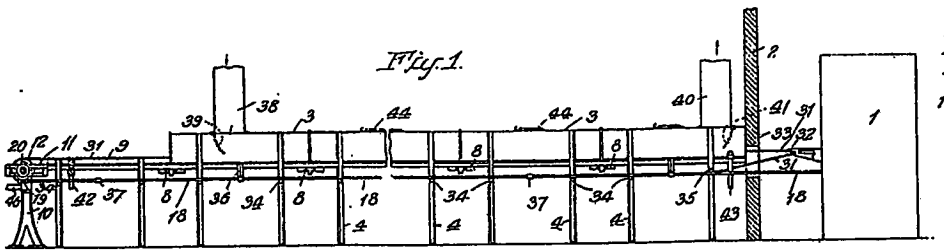

Fig. 2.

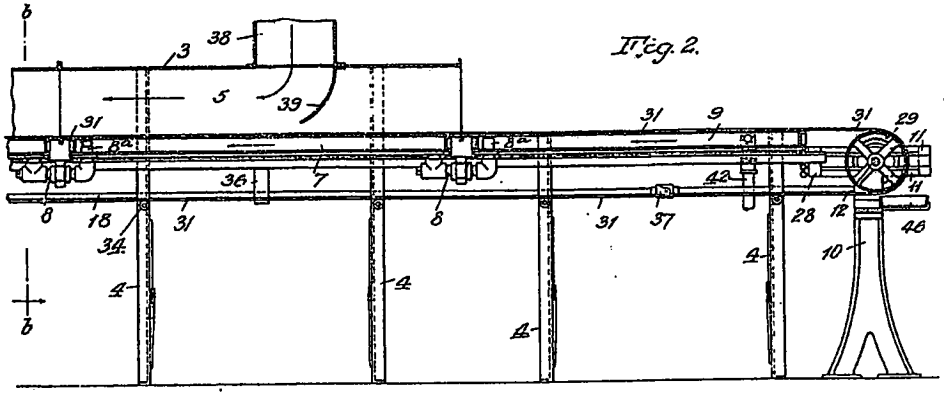

Fig. 3.

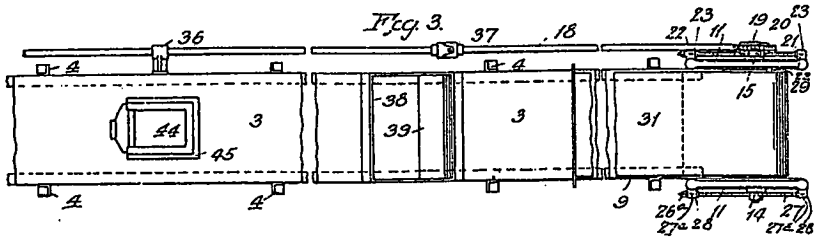

Fig. 4.

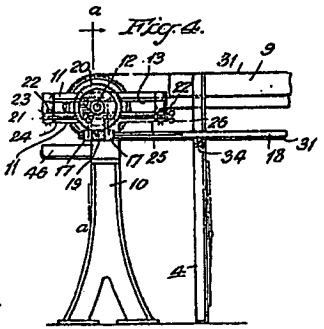

Fig. 5.

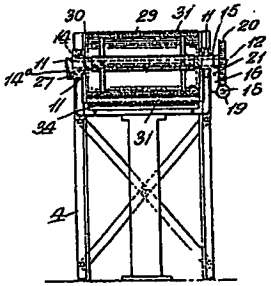

Fig. 6.